The JOURNAL of the AMERICAN DENTAL HYGIENISTS' ASSOCIATION

VOL. VI JULY, 1932 No. 7

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Published Monthly by the AMERICAN DENTAL HYGIENISTS' ASSOCIATION
at 327 Towne Avenue, Los Angeles, California

Yearly subscriptions $1.00 in U. S. A. Foreign, $1.25. Single copy 15 cents.
Remittances should be sent to Business Manager.

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All communications and notices for publication must be in the hands of the Editor on or before the 15th of the month previous to publication. Communications concerning subscriptions should be sent to the Business Manager.
Entered as Second Class Mail Matter February 24, 1930, at the Post Office at Los Angeles, California, under the Act of Aug. 24, 1912.
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DAISY M. BELL
BUFFALO, N. Y.

Chairmen, Local Arrangements Committee
Ninth Annual Meeting
American Dental Hygienists' Association

A New Conception of Gingival Therapt

By G. Albert Smith, D.D.S., *Washington, D. C.*

EVER since man first realized that he was a subject to diseases of the gingivae, he has made a conscious and deliberate effort to alleviate these disorders when they occurred. In the earliest day of therapeutic attempts, dependence was placed on charms and potions whose chief virtue lay in the incorporation of mystic substances supposed to have a magic power. These formulae were purely empirical, and we have no record that they were productive of beneficial results, other than psychic benefits which have always been of value. As time went on, an effort was made to understand the real nature of the diseases of the supporting tissues of the teeth, and efforts were made to prescribe remedies which would have a direct therapeutic relationship to the disease. This type of effort had its culmination in recent years in antiseptic therapy. The reasoning which seemed sound and was accepted by practically all in our profession, was that since infection played so prominent a part in the disease, antiseptic treatment would be the logical one. This theory has been tried for many years now, and has almost universally been found wanting.

Before dismissing the antiseptic theory, it may be well to discuss the reasons for the shortcomings of this type of therapeutic measure. This involves a brief consideration of the fundamental nature of periodontal disease. The term fundamental is used here to call attention to the fact that infection, which plays so obvious a part in the pathology of periodontal disease, is not the important factor in that disease that we have long considered it to be. Until we appreciate fully the significance of this statement it will be difficult to view the problem of treatment in a correct perspective. Periodontal disease in its early stages, is very commonly entirely lacking in the element of infection. The inaugurating factor in periodontal disease is almost invariably a disturbance of circulation in the gingivae, or cementum, or both. This disturbance of circulation may be a hyperemia due to irritation, or a partial stasis due to lack of use. Without inquiring into the elements which may induce either of these conditions, we should appreciate the fact that here is laid the foundation for infection.

Stated in another way, the thought is this; that bacteria can only

infect a tissue whose resistance is below par. This is a statement of universal application as regards the conception of infectious diseases. And, while antiseptic treatment may be beneficial in the treatment of some infectious diseases, it is a fact that in a large part, treatment of such diseases in modern medicine is founded chiefly on efforts to build up resistance. But let us also understand clearly, that resistance is not built up merely by removal of irritation. My thought in this paper is to call to your attention the means which we have at hand for augmenting resistance.

As a background for the deliberation of the measures which I will describe to you, it may be interesting to compare the opportunities of the dentist and the physician in this respect. Compare a case of suppurative periodontal disease on one hand, and pneumonia on the other. In the latter case the physician must depend largely on developing resistance in his patient, yet has almost no direct access to the diseased tissue for the application of his therapeutic measures. On the other hand the dentist can reach the part of the tissue which is most deeply involved, by means of suitable instruments. With these he can remove effete matter and much of the pathologic exudate. He furthermore has direct and complete access to the affected tissues for the purpose of producing stimulation. How much less is his excuse then, than the physician for failure to bring about resolution.

The very fact that we have such splendid access to the diseased tissue may seem to be an argument in favor of the use of antiseptic medication. A little thought, however, will serve to show the fallacy of this theory. In periodontal diseases we find, upon study of the tissues under the microscope, that bacteria have penetrated the issues for a considerable distance beyond the confines of the pocket itself. This penetration is of course, made possible by the lowering of resistance, of which we have already spoken. We, therefore, have a state of affairs in which the antiseptic cannot actually reach all of the pathogenic bacteria by any topical application made by the dentist when the patient is in the chair how much more true it is for the application of antiseptic by the patient in a form of mouth wash, dentifrice or so-called subgingival therapy.

The dentifrice as first compounded was, as its name implies, a product for cleaning the teeth by friction. The sole effect which was sought was that of cleanliness. When it was found that disease occurred even in the mouth which was kept clean, for such was actually the case, an effort was made to improve the dentifrice by incorporating in it such drugs as were believed to have a beneficial therapeutic effect. Almost imperceptibly there was at this point inaugurated the era of the antiseptic

dentifrice with its supposedly logical off-shoot, the antiseptic mouth wash. So firmly has this conception of the office of the dentifrice become implanted in the minds of the dental profession, that we unconsciously think of the dentifrices as having necessarily an antiseptic base. This is a fallacy which I wish to make clear to you.

To begin with, however, we must disabuse our minds of the thought that health in the mouth can be attained through cleanliness alone. Cleanliness is of course, desirable and necessary. But health is dependent on other things. Our thought in the care of the mouth must be first directed toward those things which make for health. And it is a striking phenomenon that when we produce a healthy mouth, we shall find that that mouth is also clean.

Health depends upon a vigorous circulation of the blood supply. Any measure which we may take which will stimulate the circulation will be beneficial. Of these measures I have found the most satisfactory to be the massage of the gingival tissue by means of the tooth brush, together with the use of a preparation which will promote osmosis of the blood and lymph in the gingival tissues. The tooth brush may be used most satisfactorily for this purpose by following the technique developed by Stillman, founded on the method first brought out by Charters. This method has been adequately described by Stillman in a paper entitled "Physical Culture for the Gingivae." I will therefore omit a description of this method.

With regard to the therapeutic aspect of the matter, we know of no substance more beneficial than sodium chloride in a form known as Normal Saline Solution. Many dentists have used this with satisfaction. It remained for Prinz to bring forth the idea of combining a normal saline solution with lime water. This latter solution has been previously advocated by Kells, Fones and Hyatt. It was not advocated with the thought of promoting osmosis but because of its apparent deturgent effect and because of its efficacy in neutralizing mouth acids. In health the mouth as a whole is alkaline, but when disease becomes established or when the mouth is unclean, the reaction of the fluid immediately around the teeth becomes acid. Not only should this acid be neutralized but it is highly desirable that osmosis of the blood and lymph be promoted. Another argument in favor of lime water is to be found in its calcium content, which would seem to make it an available source of lime for deposition in superficially decalcified enamel. The work of Bunting seems to point to such a possibility.

The combination of sodium chloride and calcium oxide to be made into a solution by the patient at the time of use, proved to be a very

marked advance in gingival therapy. This formula was first brought into clinical prominence by Stillman and McCall who used it in their practice for a number of years. When this preparation is used conscientiously the beneficial effects are plainly perceptible both to the patient and to the dentist.

In addition to the treatment I have described above, it is essential that functional occlusion be established by proper balancing, adequate and efficient instrumentation accomplished and diet deficiencies ascertained and corrected.

The gingivae becomes firm and of a beautiful translucent pink coloration. The tooth surface is clean and glossy, and the underlying tooth structure takes on the translucent appearance, easily recognized as that of health. These effects are produced not by antiseptics for the preparation contains none, in the ordinary sense of the word, but by its ability to neutralize acid, which is an irritant, and by its ability to promote normal interchange of the nutritive fluids of the parts. This is the new conception of gingival therapt.

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Nervousness in School Children as Related to Hunger and Diet*

Preliminary Report

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Reprinted by permission from the Medical Journal and Record, Vol. cxxxiv, No. 10, pages 494-499. November 18, 1931

THERE are several lines of scientific evidence which furnished the impetus for the present study of nervousness in school children. Although some of these lines of evidence originate in somewhat divergent fields, they are nevertheless focused upon the problem of nervousness in children. These converging lines of evidence are:

1. Nervousness, and its serious relative mental disorder, are but exaggerations or intensifications or maldevelopments of ordinary human traits. Nervousness is not something new but an unfortunate development of normal human potentialities which usually remain normal (1, especially Chapter 13).

2. Habits or "mental tricks" which serve a temporarily useful purpose in infancy or youth may become deeply ingrained and persist in later life when they no longer have a useful function. Early habits, in other words, may perseverate and later give rise to a case of nervousness of obscure origin (2, especially Chapter 12; 3, especially Chapter 2).

3. Slight disturbances of the internal mechanisms of the body, although not consciously perceived by the individual, and without causing disease in the ordinary sense of the term, may create visceral tensions with a resulting redundance upon the conscious behavior and thoughts of the individual in the form of nervousness (4, especially Chapter 1; 5, especially Part 1; 6; 7, page 162).

4. Hunger pangs will cause a restless irritability and increased activity in both children and adults. This is a detail of the paragraph just above, but merits separate citation since it is also probably a factor

* With the assistance of Cameron Farquhar, Richard Kehoe, and Elta A. Wolfe, R. N., and the authorization and co-operation of Sister Alexius, Principal Harvey E. Alter, Miss Ruth Cheney, Father Collins, Father Dooling, Miss Gretchen E. Haff, Sister Mary Michael, Mrs. Marian J. Norbert, Sister Pauline, Sister Regis, Sister Rosa, Superintendent George R. Staley, and Sister Zoe. Similar experimental work is under way at the State School for Feebleminded at Rome, N. Y., under the co-operation of Superintendent Charles Bernstein, M. D. The results of this special investigation will be published separately.

closely related to the role of habit formation in much apparent nervousness of obscure origin, especially in the case of children (8, 9).

5. Slight variations from normal in the various metabolic factors will precipitate traits of nervousness in both adults and children. Excitability in normal persons has been found to be correlated with the acidity of the body (10). A so-called excited type of insanity has been found associated with a general bodily alkalinity and a so-called confused type associated with a generally acid condition of the body (11). Similar findings, but not easily summarized, have been made upon excitable and lethargic stammerers (12). According to the findings of Hammett the metabolism of the excitable individual "gives indications of the possibility of there being at one time an overtaxing of the organism, and at another of the organism lacking a sufficient energy supply" (13). As severe a disturbance of behavior as is produced in epilepsy is benefited by a ketogenic or high fat die (14, 15). Fasting and a general curtailment of the amount of food eaten also bring about alterations in behavior (16, 17, 18). The relation between moderate malnutrition and nervousness in children has been studied by the Sehams and positive findings made that "symptoms of nervousness and fatigue are more numerous in children whose height-weight index is more than ten per cent below the standard than in children whose height-weight index is less than ten per cent below the normal" (19).

The late Edwin E. Slosson dramatically summarized the behavior effects of changes in metabolism by saying: "The variation of a few hundredths of one per cent in the glucose of the blood may make the difference between cowardice and courage; may determine whether a man be shot as a slacker or medaled as a hero." (A more detailed summary of the discoveries prior to 1912 is given by Barnes (20), and prior to 1923, by Bowman (21)).

6. The availability of calcium in the diet and the facility with which the body uses it is one of the predominant factors in nervous and muscular irritability. As the supply of calcium, or as its utilization by the body, is lowered the irritability of nerve and muscle, both voluntary and involuntary, is increased. As the calcium metabolism rises the condition of nerve and muscle with respect to relaxation and excitation becomes more normal. There are variations in the level of calcium metabolism from individual to individual, and the same individual may vary from time to time; calcium utilization is usually lower in the winter than in summer. The American dietary is deficient in calcium (22).

The Present Approach to a Cause of Nervousness

The scientific background which has just been outlined leads to the statement of the point of view which gave rise to the experimental work in physiological psychology to be reported. The term nervousness describes a wide range of conditions and behaviour; it is a blanket term with specificity and covers a varied assortment of borderline psychotic symptoms. These borderline psychotic symptoms in the case of children may be caused under suitable circumstances by hunger pangs or by metabolic variations, particularly by a lowered calcium metabolism. Actual involvement of the nervous system should, of course, be recognized in some instances of youthful nervousness, as should also the psychoanalytic mechanisms; but special consideration should be given, we believe, to the possibilities that most cases of nervousness among school children are simply a manifestation of the restless hyperactivity caused by hunger pangs—although the hunger pangs are not directly perceived themselves—or are a manifestation of the generally increased irritability and excitation of the body tissues as the calcium metabolism is lowered.

We must also recognize that the mechanisms of hunger pangs and lowered calcium metabolism may be effective in the causation of symptoms of nervousness which may continue after the cause is removed or made ineffective. Habit formation and the psychic compensation for organic inferiority would amply account for this. A child might develop traits of nervous behavior, for instance, over a comparatively brief period of lowered calcium metabolism; when special feedings or chemical therapy are used to overcome the deficiency in calcium metabolism the nervous traits may linger—possibly throughout life—due to the simple persistence of a habit. Some form of psychotherapy, therefore, may be needed in some cases to supplement the treatment, for although the physiological cause may be removed the effects in behavior often linger. Although not susceptible to experimentation, it is logically necessary to infer that many instances of adult nervousness started in the manner just outlined and that psychotherapy is often a curative procedure rather than a preventive measure or an explanation of the cause of the nervous condition.

The Experimental Procedures

Subjects for Study.—The scientific validity of the approach summarized in the preceding section was determined by experimentation with fifty-three nervous children in grades one, three and five of three elementary schools. The most nervous children in these grades were indicated by their teachers; those so indicated were used for the experimentation only if free from signs of malnutrition and patent physical disorder since we wished to test the role of hunger pangs and of calcium

metabolism in those instances of nervousness which would be called either functional or primarily of "mental origin." The experiments were made in the spring of 1931.

Measurement of Nervousness.—The "Behavior Check List" developed by Dr. Willard C. Olson was used to obtain a record of the degree of nervousness of these children. The children studied were reported by their teachers at the start of the experiment using the Olson check list of thirty-four nervous traits, each trait being expressed in the degree to which it was manifested by the child. This gave a *control record* of the degree and details of the nervousness of the child before any of the special feeding procedures were adopted. Later reports by the teachers were compared with these control records to determine the improvement, if any, in nervousness which resulted from the special feedings which were used to offset hunger pangs or in addition to build up the calcium metabolism.

Special Feedings for Hunger Pangs.—The feedings were given at 9:30 a. m. five days each week. This hour was chosen because some of the children came to school with only a hasty morsel or two of food as their breakfast and hunger pangs would be more likely in the forenoon than in the afternoon, and because other children ate breakfast with their family before seven o'clock in the morning and their stomachs were practically evacuated by this hour. The feeding used was a half pint of milk.

Special Feedings for Calcium Metabolism.—These feedings were given at the same hour as those for hunger contractions alone. The feedings for calcium metabolism, of course, were effective in offsetting hunger contractions also but the plus value of building up the calcium metabolism was added. A readily digested food concentrate was added to a half pint of milk for these feedings. The concentrate contained 0.369 per cent of calcium, 1.275 per cent of phosphorous, and 70.2 per cent maltose and lactose. Vitamin D was also present. The concentrate was flavored slightly with cocoa and was relished by the children. Enough was added to the milk each day to meet the calcium requirement for growing children of one gram of calcium each day. It is important to note that vitamin D and phosphorous were present in the concentrate finally selected for these feedings; both of these are essential for the utilization of the calcium. The lactose content of the concentrate also facilitated the ready absorption of the calcium while sucrose would have had a detrimental effect. With these associated factors of phosphorous, lactose and maltose, vitamin D, and the practical absence of sucrose in the special feedings we can be fairly certain of an increased calcium metabolism without recourse to determinations of serum calcium.

Avoiding Bias by the Teachers.—All those co-operating in the experiment knew the aim of the work. But to avoid bias or prejudice, one way or another, in the behavior check lists of nervous traits prepared by the teachers they were kept ignorant of the exact feedings which were given at any period of the experiment to the children from their room. At 9:30 each morning the children left the room and reported to the nurse or principal where they received the feeding. Some of the pupils from one room would receive plain milk, others the milk plus the concentrate, and others would play with toys during their absence from the classroom and receive no special feeding, being kept ignorant of the fact that the other children were receiving any feeding. We have thus two procedures for avoiding prejudice in the teachers' reports of nervousness: 1, the teachers did not know which children were receiving feedings, and 2, a *check squad* of children who had received no feedings was available to use in evaluating any prejudice that might appear.

Experimental Findings

Children Receiving No Special Feeding.—There were ten children who early in the course of the experiments received no special feedings either to offset hunger contractions or to build up calcium metabolism. These ten left their classroom at 9:30 a. m. along with the other nervous children but spent the ten minutes period of absence in playing with special toys. The check squad showed only 2.3 per cent improvement in their nervousness at the end of a two weeks period. This slight gain may indicate bias on the part of the teachers, but is more likely to represent the usual improvement that takes place when any nervous individual is given some personal attention—a well known principle of psychotherapy. At any event this gain of 2.3 per cent should be subtracted from any gains from feeding either plain milk, or milk plus food concentrate, since this slight gain represents what might be termed a vicarious factor. It is apparent that there is no appreciable improvement in nervousness in this squad of children who received no special dietary attention.

Change in Nervousness in Children Who Received Milk Only.—An improvement of 8.2 per cent in nervousness was shown after two weeks' feeding, aimed to offset hunger contractions primarily. This is nearly six per cent more gain than shown by those receiving no feedings, and must be looked upon as a definite improvement in the nervous condition. The role of hunger pangs in causing nervousness is more outstanding in some of the children than in the case of others. There were eight out of the seventeen in this squad, for instance, who showed no improvement or who were slightly worse, leaving nine who improved much more than the average net improvement of six per cent. It is

apparent from the findings, however, that approximately fifty per cent of nervous children in the first five grades of elementary school can be appreciably improved in their nervous condition by merely offsetting their hunger pangs by a special feeding at 9:30 a. m.

There were only three traits, however, in which the plain milk feedings for two weeks made the children better by twenty-five per cent or more. These were as follows: less easily fatigued; more even tempered; less uncommunicative.

In addition there was an improvement of from ten to twenty-four per cent as follows: less abstracted and more wideawake; more careful and less slovenly in thinking; more careful in personal appearance; can compete better on a physical basis with others; more persistent and less easily discouraged; less contrary and more open to suggestions; less impulsive and acts with more reasonable care.

Improvement in Nervousness of Children Who Received Milk Plus Food Concentrate.—The average improvement in nervousness after two weeks' feeding to build up calcium metabolism was 15.6 per cent. This gives a net average gain of more than twice that resulting from feeding milk alone to offset hunger pangs. In addition building up the calcium metabolism over this short period disclosed only three out of the twenty-one children in this squad who failed to improve when fed the milk and food concentrate. In the case of the plain milk feedings roughly half of the children failed to improve, but in the case of feedings to offset both hunger contractions and to build up calcium metabolism marked improvement in nervousness was shown by eighty-five per cent of the school children. The fifteen per cent who did not show improvement may be looked upon as possibly organic or psychoanalytic cases of nervousness.

There were fifteen traits—three times as many as with the children receiving milk only—in which this group improved twenty-five per cent or more. This major improvement was localized as follows: less easily fatigued; more even tempered; less uncommunicative; less tendency to jump from one task to another; less sluggish in thinking; more careful and less slovenly in thinking; boys became less effeminate and more masculine; lives less to himself and becomes more sociable; lessened tendency to criticize others; more persistent and less easily discouraged; more self-control in unpleasant situations; less apprehension and worry; more willing to discuss himself or his problems; less excitable and more emotional calmness; less impulsive and acts with more reasonable care.

In addition there was an improvement of from ten to twenty-four per cent in the following directions: less abstracted and more wideawake;

more careful in personal appearance; can compete better with others on a physical basis; less fearful and less lacking in "nerve"; asserts himself more; less depressed and moody; less contrary and more open to suggestions.

The great advantage of the feedings of milk plus food concentrate is shown by a special two months experiment in School No. 1. Squad A, was given only milk during this experiment, except during the second two weeks period when the concentrate was added to the milk; at the end of this second period there was a gain of nearly ten per cent over the original gain in nervousness brought about by the use of the milk alone. During the third and fourth two weeks period milk only was again given, but during the third period there is still an advantage over the first period, indicating that the improvement in calcium metabolism is not lost suddenly. This improved calcium metabolism which brings about the improved conditions in their nervous behavior is lost, however, in the fourth period, indicating that the stimulation of the calcium metabolism by the feeding during the second period of two weeks is lost after a month. Apparently the calcium metabolism needs to be attended to consistently and it should be watched in the daily diet rather than sporadically.

Sex and Age Differences in Improvement in Nervousness.—We do not wish to emphasize this section of the report, for statistical reasons, but there are strong indications that boys are more amenable to improvement than are girls in the case of both feedings; this sex difference is more marked in the feedings of milk alone.

There are also strong indications that the children aged nine to twelve are more susceptible to improvement as a result of both feedings than are the children aged six to eight. This is less marked, however, than the sex differences, and is also more marked in the case of feedings of milk alone.

Illustrative Case

William was nine years old and had a nervousness score of 129 at the start of the experiment; the median score for nine year old boys as reported by Dr. Olson is 67.5 which indicates that there is little doubt about William being a nervous child. After two weeks of the feedings of milk plus food concentrate his score was reduced to 68—without his teacher being aware that he was receiving the feedings. At the end of the experiment his teacher reported as follows:

"There has been a marked improvement in this child during the past four or five weeks. He has appeared more interested in classroom happenings, which previously had no effect on him. Has even at times

volunteered information without being asked, which was an unheard of occurrence. Lessons, too, have been grasped more quickly and given back in a more intelligent manner. Since this child was a real problem, and home conditions are far from what they should be, his expansion has been really wonderful."

The following descriptive phrases contrast William's undeniably nervous behavior at the start of the experiment with the improvement after two weeks of the special feedings to offset hunger and build up calcium metabolism:

AT START	AFTER TWO WEEKS
Frequently became abstracted	Less tendency to become abstracted
Difficult to keep at task until completed	Attention adequately sustained
Extremely slow in thinking	Thinks with ordinary speed
Very slovenly and illogical in thinking	Moderately careful in thinking
Mentally lethargic	Ordinarily active mentally
Indifferent and unconcerned about things	Displays ordinary curiosity and interest
Unkempt and very slovenly in personal appearance	Unconscious in personal appearance
Repulsive bearing and physique	Generally unnoticed physique and bearing
Weak and handicapped in competing with others	Can hold his own
Extremely sluggish	Moves with average speed
Does not have ordinary endurance	Endures satisfactorily
Has average boy qualities of masculineness	Has average boy qualities of masculineness
Will take reasonable chances	Will take reasonable chances
Upholds his end of talk	Upholds his end of talk
Occasional violations of honesty, etc.	Occasional violations of honesty, etc.
Lives almost entirely to himself	Follows a few social activities
Bold and insensitive to social feelings	Socially conscious
Entirely resigned, accepts all authority	Ordinarily obedient
Slow to accept new customs and methods	Conforms willingly as necessity arises
Sometimes unmannerly or saucy	Sometimes unmannerly or saucy
Never asserts self, servile	Holds his own, yields when necessary
Has a noticeable critical attitude	Less criticizing
Stolid, rare changes of mood	Is happy or depressed as conditions warrant
Melts before slight obstacles or objections	Tries a bit more before giving up
Generally dispirited	More good humor
Aggravating, cruel	Ordinarily friendly and cordial
Rarely blows up	Rarely blows up
Easygoing	Does not worry without cause
Volunteers nothing, must be pumped	Conservatively co-operative
Accepts everything without question	Generally unsuspicious and trustful
No emotional responses, apathetic, stuporous	Emotions are slowly aroused
Complies slowly	Is generally openminded
Impulsive, bolts, acts on the spur of the moment	Acts with reasonable care

Discussion

"The proof of the pudding is in the eating," and the proof or disproof of hypotheses is experiment. Thus the experiments cited reinforce the hypothesis that hunger pangs and/or calcium deficiency are a prevalent cause of nervous behavior. It is a known fact that hunger causes acute peristalsis of the stomach and renders the individual restless and irritable. Another fact is that the diet of the children experimented upon was probably deficient in calcium.

We know that calcium exerts a striking action upon nerve and muscle activity. Calcium controls the proper functioning of the voluntary and involuntary muscle and the proper nerve action and thus plays an important role in depressing excitability and diminishing irritability, with a reundant effect upon hunger contractions very likely.

It has been shown that lactose enhances the absorption of calcium (22). The presence of lactose in the food concentrate used in the experiment is of evident significance.

Another fact is that calcium influences the action of adrenalin so that if the blood lacks calcium, adrenalin loses its effect. We know the effect of adrenalin on activity and alertness. As lack of calcium in the blood causes adrenalin to lose its effect, it thus can be seen why the child whose diet is deficient in calcium lacks alertness and liveliness. By reason of this deficient calcium he also lacks control of nerve and muscle function, is irritable and nervous.

With these facts before us it may be rightfully deducted that hunger in the broad sense is a cause of neurosis.

It is hoped that this experiment will serve a double purpose, to-wit: 1. Experimental demonstration of a scientic point. 2. It may help to convince school board officers and others who are not yet convinced of the importance of school lunches for children that the necessary funds be provided and neurosis in this class of children lessened and possibly prevented.

Summary

1. Nervousness in elementary school children is definitely related to hunger and diet in more than half of the instances of children who impress their teachers as obviously nervous and who are free from signs of malnutrition and organic disease processes.

2. Special feedings of milk between the first two meals of the day to offset hunger pangs bring a net improvement of nearly six per cent in the nervousness of the average child, although approximately half of the children show no improvement.

3. Special feedings of a food concentrate to build up calcium metabolism as well as to offset hunger pangs bring a net improvement in nervousness of more than thirteen per cent in the case of the average child; all but fifteen per cent of the children improved in nervousness under this régime.

4. Calcium metabolism in elementary school children needs to be nurtured steadily from day to day.

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Glandular Diseases in Relation to the Oral Cavity

By CLAIRE L. STRAITH, M.D., D.D.S., *Detroit, Mich.*

(Read before the Michigan State Dental Hygienists' Annual Meeting, April 11-13, 1932, Detroit, Michigan.)

IN recent years the question of diet with special emphasis upon the calcium and vitamin content of foods has been occupying considerable attention in the dental profession. Many, however, have overlooked the fact that these efforts may be largely futile unless the body tissues are capable of assimilating and retaining this calcium. It is in this respect that the glands of internal secretion are found to play a very prominent part.

In the light of this glandular effect, we can no longer regard the teeth as a separate entity, but they must be considered as a part of the body as a whole and subject to constitutional changes that effect other tissues. Probably Waller, of England, was one of the first to bring out the fact that thyroid insufficiency played a part in dental decay. The accepted theory of the exciting causes of decay is carbohydrate stagnation with resultant fermentation, acid formation and enamel softening is probably correct but it is undoubtedly also true that the predisposing causes is often an endocrine derangement that upsets metabolism so that the assimilation and fixation of lime salts in the body both before tooth eruption and afterward is interfered with. This is a very important factor in the treatment of dental disease for if the teeth can be made immune by gland therapy, the exciting causes will be much less important.

Lime salts are used in the body for two purposes, first as inorganic salts, helping to build up the body framework, and secondly, as an alkali reserve in the body necessary to give tone to the muscles, heart regulation and keep nerve tissue in proper condition, et cetera. This calcium enters the body through the digestive tract but the body can be gorged with a high calcium diet and yet this may be quite useless, unless the salts are definitely assimilated, fixed and held in the tooth substance and its supporting structures. It has been estimated that a very small amount of calcium, if absorbed and fixed is sufficient for the adult, approximately three-quarters drahm daily, and practically any diet contains this requirement, therefore, we must rely more than ever on proper gland function for the utilization of this calcium.

With the thought in mind that dental problems are largely the result of calcium imbalance let us consider the needs of the body at different periods, viz., the period of growth, reproduction and decay.

Before birth the organism is growing at a tremendous rate and the body is hungry for lime salts to be laid down in bone and tooth structure. It is well known that disturbances in the glandular secretions of pregnant mothers, such as hypothyroidism often results in rachetic children because the glands controlling the fixing of calcium in the tissues, especially the thyroid and parathyroid, were out of balance. The deciduous teeth decay rapidly in such offspring and are lost, and in some instances the second teeth fail to erupt. Some others attribute this uneruption and malformation of certain teeth, especially the lateral incisors, to the poor function of the thyroid gland.

After birth this period of growth goes on for several years and the life history of the child is written down for the first ten years of life on the enamel surfaces of the teeth which can be read like an open book in some cases.

We know that it takes approximately six years for the enamelization of most teeth. We also know, that this process starts in the permanent teeth at birth and therefore, the child's internal glandular system must be entirely responsible for the development after birth. When we see a child with the tips of the anterior teeth poorly formed, we can come to the conclusion that this was a poorly nourished baby during its first year and one who inherited a poorly functioning glandular system, or the endocrine system was thrown out of gear by poor nutrition or disease. If one examines the cusps of the six year molars, it will be noticed that these, too, are defective, because they were being formed at the same period, and in many cases these six year molars are lost early.

Other patients will present a line of pit-like cavities across the center of the anterior teeth and we can usually learn upon inquiry that this patient, as a child, had a very serious disease at about three years of age—all going to show that the parathyroid and other glands which control calcium absorption and fixation were temporarily out of balance.

During the period of reproduction, or adult life, the difference between intake and output of calcium is more stable, and men, at least, need like largely to replace waste. In women, however, there are bound to be sudden changes and alterations in the demands for calcium due to the demands of pregnancy, lactation, menstruation, et cetera, and therefore, the endocrine apparatus should be, and probably is in a more highly functioning state than in the male. The increased drain on calcium in the course of pregnancy has been experimentally established and the fact

so well recognized that the fetus has been called the calcium parasite. It then behooves every pregnant woman, not only to eat plenty of foods with mineral salts, but also to be especially sure of her glandular metabolism functioning properly.

In the third period, or period of decay of life, less calcium is necessary for growth and repair, therefore, there is considerable excess which is deposited in arterial walls about the joints, secreted in saliva and deposited about the necks of teeth and trouble commences. In this situation pyorrhoea develops, probably due to increased calcium deposited, relaxed membranes about the teeth and other factors.

Many authors have remarked about the fact that those patients who have had little decay, probably due to a well-balanced endocrine system which has kept up a continual process of tooth hardening by calcium deposits, are the ones who develop pyorrhea and conversely those whose teeth have decayed rapidly are less susceptible to the developmnt of pyorrhea.

In consideration of this subject it is of enough importance to stress the fact brought out by many authors that focal infection plays a very important part in producing imbalance of the endocrine system, that the eradication of dental and other sources of infection is essential in the treatment of such conditions.

There seems to be a very definite association between focal infection and diabetes and also with obesity for the two usually go together. It is also quite well known that during the period of the menopause there is a striking loss of teeth among women. Some authors have estimated that over fifty per cent of goitre cases have mouth infection and advise the elimination of all such foci in the treatment of this condition.

In conclusion let me suggest that in the consideration of mouth conditions it would seem wise to remember:

First—That pre-natal influence controls to a great extent the tooth formation.

Second—During childhood—adult womanhood especially, the needs for calcium are greatest.

Third—All focal infections should be removed where endocrine disturbances are suspected.

Fourthly and Lastly—That endocrine derangement will account for the majority of all conditions leading to tooth decay and loss of teeth.

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Editorial

EDUCATION AS PART OF THE SCHOOL PROGRAM

MANY times of late, the question has been asked, "Is an educational program essential in the promotion of Mouth Hygiene, particularly in Public School work?"

It perhaps is not essential but there is no doubt in mind but that the dental hygienist who is conducting one along with her clinical work is getting much better results than the one who is not.

Occasionally, I have been told by school superintendents that the dental hygienists employed by their districts work only at the chair because the health teachers were supposed to include teeth in their general health program. With all due respect to the health teachers what instructions they find time to give are only a "drop in the bucket." So busy are they with their many duties that seldom have they an opportunity to present to the child other than what appears in the textbook and this we know is entirely inadequate.

So much more reason for the dental hygienist to make herself responsible for the entire dental Hygiene Program if at all possible. The success of our program or the fail-

ure as the case may be is attributed to our department—not to the lack of interest, time or ability of the classroom teacher. It is our field and upon us entirely depends its acceptance.

It may take a long time to win your point. We have districts even now, after years of effort that refuse to concede it. In the minds of those directly in charge, the place for the dental hygienist is at her chair from nine o'clock in the morning until school dismisses and she has no place at all in the school room. We have not given up hope. We know our limitations but we also know wherein lies our strength. It may take as many more years until we find ourselves in the position we desire but it will pay to keep on trying.

I may present many arguments in favor of mass education but why, when you know them too? The best results are what we wish most, those results that will find our small patients eager for the best we have to offer—a clean and healthy mouth. Decide in your own mind if you are accomplishing the most thorough direct clinical service or if you could do more by including an educational program—then go after it. It is only a small world that is composed of people who think that they alone know all; the rest are willing to learn. If we are to gain the respect that is due our profession and make it a permanent one, we must begin at the beginning; decide in our own minds the right way and then educate those with whom we come in contact to realize that we do know best how to get results for which we are striving and then prove it by getting them.

Three things are given for man to do,
To dare, to labor and to grow;
Not otherwise from earth we came,
Nor otherwise our way we go.

—Bliss Carmen.

Annual Meeting

The Ninth Annual Meeting of the American Dental Hygienists' Association will be held in Buffalo, New York, September 12th to 16th, 1932.

Agnes G. Morris,
Secretary.

Buffalo---The Convention City

TO the visitor, whether by rail, steamer, or automobile, who is delving into the phenomena of civic, industrial and commercial urban development, in this country, Buffalo offers unique opportunities. It is reached by all three systems of travel—rail, boat, or automobile.

Perhaps one of the most significant characteristics of Buffalo to visitors lies in the fact that there are no "Keep Off the Grass" signs in Buffalo's parks. The parks belong to the children. Any city that consistently concentrates on the interminable problem of recreation and health for its children has its sure place in urban development in this iron-bound age of materialism.

Not that Buffalo parks are few and far between or insignificant in size; on the contrary, it is particularly blessed in this respect. It has enormous park facilities tied together by an adequate system of boulevards. Through the medium of these, the outdoor spaces and roadways, the visitor is extended a hospitality, more or less intimate, which has made this city famous. There is an atmosphere of good-fellowship and co-operation in this town which has been maintained even during the period of astounding commercial development which has placed Buffalo among the leading financial cities of our day.

Scarcely 200 years ago, the land now occupied by Buffalo and its environs, was peopled only by Indians. Virgin forests ran from the lake shore inward and the twang of bowstring and the crack of rifle shot were the only man-made sounds within the radius of what is now a densely populated territory. The first white settler arrived on the scene in 1784, followed in 1790 by the Holland Land Company which established the trading town known as New Amsterdam, on Buffalo Creek.

Just before the war of 1812, the growth of this little settlement had increased to the proportions of a thriving town and New Amsterdam gave way to the more euphonic name—Buffalo. With the development of Ohio, and land farther West, Buffalo found itself in a strategic position with respect to barter and even then it was recognized as the "Gateway of the West."

Prior to the coming of the railroads and the building of waterways, the Great Lakes served as the arteries for trade passing through Buffalo. But with the tremendous development of the transportation facilities of rail and road, Buffalo has come into its own as the key-city of many industries which have marked the progress of civilization on this continent.

It may be said with truth, that the first influence for growth was the building of the Erie Canal, undertaken by the State of New York in 1817 and opened for traffic throughout its length in 1825. This waterway, also utilizing the Hudson River, forever bound Buffalo and the Atlantic seaboard by a continuous stream of water-borne commerce.

The Erie Canal was remarkable in this respect: It followed the water level used by the roving Indians who canoed back and forth through the center of the state along the beautiful valley of the Mohawk River. By following this route, a climb of only 424 feet above the Hudson was sufficient to reach Buffalo. Naturally, then, through the gateway of Buffalo were carried the grain and livestock of the middle west to the east, while manufactures and imports destined for the lake communities, went over the same route westward.

With the opening of the canal, lake commerce grew at an astounding rate. As early as 1836, grain, including flour, received at the port of Buffalo amounted to a million and a quarter bushels. About 1846, with the coming of the railroads, thirteen and a half million bushels was the annual inflow. In 184$3 direct rail connections were completed between Buffalo and Albany, and this line, a dozen years later, was extended westward to Chicago and when, in 1870, the Grand Trunk made Buffalo its eastern terminus, the city was forever marked as a great railroad center.

The chief effort of the business men of the community was centered in the development of the lake front and port facilities to accommodate the enormous influx of the foodstuffs, later followed by the huge traffic in coal. Practically all of the business was centered around the docks and it was there that the commercial organizations maintained their headquarters, which was natural, the chief industries being the transfer of cargo from lake to rail, and lake to canal, marine insurance, and those phases of business which are indigenous to a great port of commerce.

To accommodate the fast expanding trade in grain, the first commercial steam elevator in the world was erected on the lake front, in 1843, by Joseph Dart. Today there are sufficient grain elevators to store more than thirty million bushels of grain at one time. In fact, the grain receipts of the port at the present time total more than 250 million bushels a year. The flour milling industry has moved from the west to Buffalo where its daily output is eighty thousand barrels of flour.

In like manner, the growth of the coal distribution industry has expanded from nine hundred tons in 1842 to sixteen million tons annually. Four-fifths of the anthracite shipped on the lakes is loaded at Buffalo. These features of the city's commerce naturally mark it as a great foreign

shipping port. It ranks the sixth city in the Union in the importance of its water-borne commerce and more than ten million boats arrive and depart from its docks in a single year. The annual tonnage approximates twenty million tons for seven to eight months of open lake navigation, which is in excess of the tonnage of any one of the world's largest seaports, namely: Liverpool, Shanghai, Marseilles, Colombo, Cardiff, and Singapore, despite the fact that these seaports operate twelve months a year.

In rail transportation this city is a leader. Each day five hundred freight trains arrive and depart from its yards. Moreover, three hundred passenger trains arrive and depart daily; and within the city limits more than seven hundred miles of railroad tracks are required to handle this enormous traffic. This embraces twenty huge switching yards with a capacity of fifty-seven thousand cars. There are three tracks provided for express cars, accommodating one hundred cars at one time, and with these facilities the railway express companies handle the largest express traffic of any city in the United States.

We have cited enough statistics, by all odds, and nothing has been said about the lumber industry, the iron ore traffic, the linseed crushing plants, soap making, rubber manufacturing, tanning; nor have we dwelt on the facts detailing the 2,933 industries located in Buffalo and is surrounding towns, with their 116,645 wage earners, whose payrolls total $153,870,268, and who manufacture goods valued at $927,409,830 each season. But enough has been said about the commercial growth of Buffalo to give adequate expression to the enterprise of its citizens. They have been busy making money, but they are a splendid, public-spirited group. They have spent their money in beautifying their city, making it more comfortable and healthful to live in; providing adequate education facilities; establishing hospitals, and now a great movement for civic beautification and home development is reaching fruition.

The heart of the city, Niagara Square, is the site of the civic center. Here has been erected Buffalo's new City Hall, west of the McKinley Monument, a tall shaft of white marble. On the east of the Monument is the new State Building.

The Peace Bridge, connecting Buffalo with Canada, is one of the most heavily traveled of pleasure bridges in the country. Three million cars passed through Buffalo into Canada last year; and, by the way, Buffalo is the principal border city to Canada and the gateway to Georgian Bay, Muskoka, and the North County of the Dominion.

Lower Delaware Avenue terminates at Niagara Square, and, like Fifth Avenue in New York, this portion of the thoroughfare has become

a row of specialty shops, hotels, apartment houses and stores. The upper end of the avenue, the site of splendid homes set far back from the street, with double rows of elms, will impress visitors as it did Marshal Foch when he visited Buffalo shortly after the World War. He said there was one American city which impressed him more than any other—the city which was like a forest of trees.

Near North Street is the colonial house where Theodore Roosevelt took the oath of office as President of the United States, following the death of the martyred President McKinley who died in the home of John G. Milburn on Delaware Avenue, a few blocks northward near West Ferry Street. On the Avenue, at West Utica Street, is the Catholic Cathedral, a splendid structure of white marble. Its carillion of bells is the largest in the country. So large are these bells that when first rung in the old cathedral from which they were removed on completion of the new edifice, they caused a crack in the steeple and for years its safety compelled the church to keep the chimes silent.

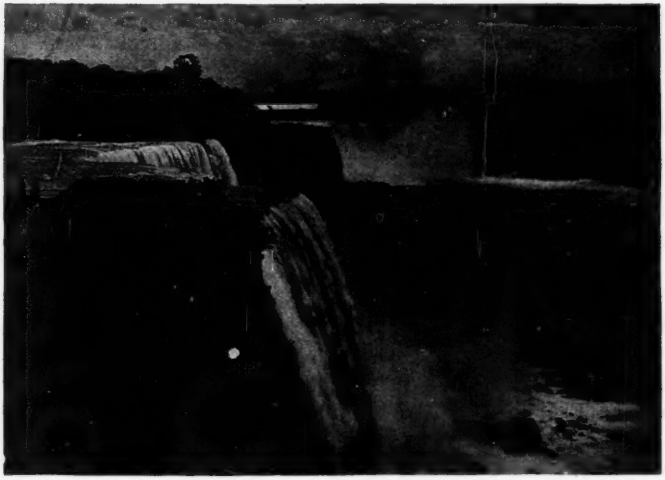
No city offers greater attraction for the visitor than Buffalo. He can come in his own car, or hire one, to drive in the city and the surrounding country. Buffalo has more miles of asphalt-paved, tree-canopied streets than any other city in the world. This frontier of two great nations, unmarked by gun or fortification of any kind and maintained in peace and security for more than one hundred years, constitutes historic ground. On both sides of Niagara River, throughout its entire length, were fought some of the hardest contested battles of the War of 1812, and these historic places are marked by monuments, parks, and suitably inscribed tablets.

Under the Department of Parks, the city has recreated forty-six recreational centers, with two hundred and fifty classes; one hundred and fifty are day class, one hundred, evening; 14 city playgrounds, 6 wading pools, 4 swimming centers, 20 regulation baseball diamonds, 60 tennis courts, 2 golf courses, 6 football gridirons, 6 croquet grounds, 2 lawn bowling rinks, 2 land hockey fields, 2 cricket grounds, 10 skating rinks, and 10 toboggan slides. As many as 10,000 persons have enjoyed skating in Delaware Park on a bright winter afternoon.

Delaware Park, embracing 365 acres of 1,300 included in the city's park area, is a formal garden and meadow near the northwestern end of the city approached by Delaware Avenue and Lincoln Parkway. Delaware Park formed a part of the grounds used in 1901 for the Pan-American Exposition. There is no natural forest here, nor high river banks, but level lawn; a great meadow partly occupied by golf links, tennis courts, and a bowling green. Park Lake, an artificial body of

water formed by widening the Scajaquada Creek, which flows through the park, is the gala water.

Buffalo occupies the key position on the Niagara Falls Frontier, from which to visit and enjoy the great Falls. From its very door, Lake Erie's outlet, the rushing Niagara, flows northward, impressive for its width, depth and silence, resistless current, as well as for the beauty of the country through which it passes. Opposite the city limits, at Riverside Park, the Niagara divides in two streams, widening many miles around Grand Island, and coming together again into a single swift channel, within sound of the Falls. Here the current of the river quickens, in the upper reaches of the rapids, and a little farther on, at a breathless galloping pace, the waters of the Great Lakes go rushing and plunging to the brink of the Falls, to tumble 162 feet into the marvelous gorge below. From there they dash, roar and seethe through the lower rapids, to the quiet of the river beyond Lewiston, whence they flow into Lake Ontario on the way out to the sea.



Come to Niagara

ONE of the high spots of the Ninth Annual Convention of the American Dental Hygienists' Association to be held in Buffalo, N. Y., September 12 to 16, 1932, will be the pleasure trip to Niagara Falls. In and within a few miles of Niagara Falls is a wealth of scenic beauty and historic attractions. Chief among these are the Falls, themselves, which should be seen from both the Canadian and American sides. Then there are the upper and lower rapids, the Whirlpool, the lower river where it empties into Lake Ontario, Old Fort Niagara, the great hydro-electric power houses and many interesting trips on the Canadian side. All this culminates in a night view of the Falls, which are illuminated nightly with a battery of twenty-four searchlights using a total of 1,440,000,000 candle power, which for kaleidoscopic grandeur presents a vari-colored panorama unrivaled in the whole world.

The trip will be made by bus from Buffalo and will include a view of the Falls and their surroundings, a trip through Niagara's Great Gorge, luncheon at the historic Cataract House, a trip to Fort Niagara, and as many as desire may remain for the illumination.

The trip through the gorge will include the best-known and most-photographed view of the Falls from the Upper Steel Arch Bridge, a view of Queen Victoria Park, owned by the Province of Ontario and embracing 196 acres. From Brock's Monument may be seen a remarkable view of the lower Niagara and Lake Ontario. From the historic village of Lewiston, visitors will pass through the gorge along the edge of the rapids. Here the river takes an abrupt turn at right angles and forms the famous Whirlpool. This great basin, some 60 acres in extent, lies at the foot of frowning, towering cliffs. Through these rapids the rocky bed of the stream is so precipitous that the waters descend at a speed of between 25 and 30 miles an hour at places, effecting mammoth waves and a most picturesque spectacle.

Luncheon will be served at the Cataract House which fronts on the State Park within stone's throw of the American rapids. So near that if you are not too busy renewing old acquaintances and chatting with new friends you have made during the meeting, you can hear the roar of the cataract. This historic old hotel was built in 1814. The present management possesses registers dating back to 1825 and containing the names of nearly every president of the United States as well as most of the royal families of the world who have found food and rest within its walls which are of solid masonry two feet thick. The Colonial and

Mid-Victorian atmosphere of the spacious parlors and ball room has been preserved by the use of much of the original furniture.

After luncheon, visitors may stroll down to Prospect Point and view the American Falls which plunge to a depth of 165 feet. In the spray that rises from the great falls, you may fancy you see the form of the fair Indian maiden, daughter of one of the chiefs who was selected to be sent over the falls in a white canoe filled with fruits and flowers. For it was the custom of the Indians each spring to select the fairest maiden of the tribe to be sacrificed to the Great Spirit in return for their crops and the result of the chase. According to the legend this practice stopped when the chief upon whose daughter this honor was bestowed was so filled with sorrow that he followed her in another canoe. You no doubt will, as did La Salle, the first white man to view the falls in 1669—"stand silent 'neath its thrall."

The bus will then be waiting to take us for a trip around the Three Sister Islands and down to Old Fort Niagara. This route passes the DeVeaux Military School, the Whirlpool Park, Devil's Hole Park, Niagara University, the Niagara Falls Country Club, the lower Niagara River and fruit belt, the old fishing village of Youngstown, to historic Old Fort Niagara.

This fort has recently been restored to its original condition and is the oldest existing piece of masonry west of the Hudson River in the United States. Here one may enter and leave the grounds as did the Indians, French, British and early Americans during the many years the fort played an important part in the development of the continent. The outer fortifications, the Civil War casements, the log cabin that served as a storehouse and artificers' hut for the guardsmen, the cannon mounts, furniture and equipment are being repaired and restored and will be completed this summer.

With a farewell look at Lake Ontario, we will leave the fort and thoughts of history behind and return to Niagara Falls. Those who have not seen the illumination will want to stay over for the evening. The cost of the trip will be made as reasonable as possible.

All of the points of interest cannot be included in a single day but further information will be furnished at the registration desk in the hotel for any who wish to remain at the Falls a few days. A corps of well-informed guides will show guests through the generating station wherein are installed the largest hydro-electric generators ever built. Guides will also be furnished for a trip through the Shredded Wheat Plant, the most hygienic food factory in the world. Then there is the Spanish Aerial

(Concluded on Page 31)

As a distinct advance in ORAL PROPHYLAXIS

The new cleansing and polishing material in Pepsodent Toothpaste possesses several distinct advantages.

THE new cleansing and polishing agent in Pepsodent Toothpaste represents a distinct advance.

In the first place this new polishing agent is extremely soft—being approximately one-half as hard as chalk. It passes through a 400-mesh screen—thus giving it a fineness of texture unsurpassed by other processes.

The improved Pepsodent Toothpaste imparts a beautiful lustre to tooth enamel. It removes mucin plaque effectively and safely.

The Formula

Special Calcium Phosphate . .	**59.400%**
Benzoic Acid	**0.100%**
Tragacanth Gum	**0.600%**
Karaya Gum	**1.200%**
Calcium Chloride.	**0.237%**
Glycerine, water, flavor . . .	**38.463%**

As a flavor, delicious, cooling, redistilled mint oils are employed.

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Question Box

Questions you desire answered should be received by the Editor on or before the fifth day of the month preceding publication, in order to be answered in the forthcoming issue of THE JOURNAL.

1. May a dental hygienist become a member of the State Society if she is practicing with a dentist who is not accepted by the State Dental Society?

Answer. No.

2. Is it necessary for a dental hygienist to be a member of the State Society before she is accepted by the National Association, providing such a society exists?

Answer. It is not possible for a dental hygienist to be a member of the National Association without being a member of the State Society nor can she belong to the State Society without being a member of the National, under our present constitution. Pennsylvania is an exception where because of the required interneship, the dental hygienist is not permitted to become a member of the National Association until she is registered. During said interneship, she is known as an "Interne Active Member." Upon completion of her interneship she is duly registered and eligible for active membership in both State and National Organizations.

3. May a dental hygienist use ammonium fluoride for removing stain from the teeth?

Answer. No.

4. In planning programs for local society meetings, can you suggest some subjects on which the dental hygienists themselves can prepare papers?

Answer. There are numerous subjects, almost too many to mention, but a few that seem to appeal to the majority are: "The Dental Hygienist in the Various Fields, Namely: Private Office, Hospital, Public School, Industrial, and Institutions." The dental hygienist in preschool activities also presents interesting material. A round-table discussion brings out many points of interest in the several fields. One person may prepare a paper in which several questions are asked as well as answered by the writer. After each one is given the questions are open for discussion by the others.

Come to Niagara

(Continued from Page 28)

Scenic Railway over the Whirlpool crossing the raging waters below at a height of 150 feet. This is the longest, safest aerial cableway in the world. Some might wish to take advantage of the opportunity to make a daylight trip across Lake Ontario to Toronto, the Queen City of Canada. Toronto can be reached by splendid highways either by bus line or private automobiles. Regular daily trips by way of the Canada Steamship Company's steamers with special sight-seeing arrangement and luncheon in Toronto may be arranged very reasonably.

The Dental Hygienists of Niagara will arrange this trip and serve as your guides. Plan to stay over for Friday and enjoy a day of scenic beauty and good fellowship that will linger on long after the convention has ended.

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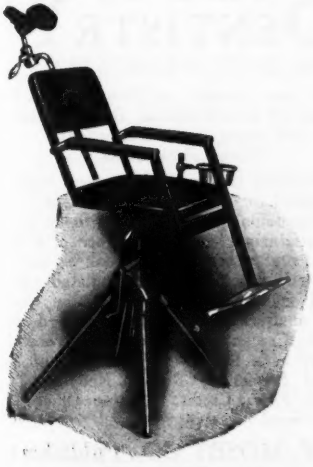
Archer Dental Hygiene Chairs



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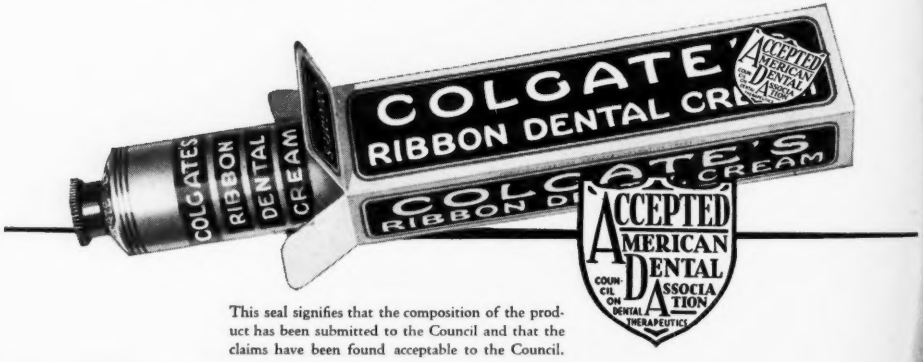

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